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VIEWS, NEWS AND INTERVIEWS.

"Once when I was traveling between Dallas and Austin, Texas," said an electrical salesman, "I noticed a roughly clad man in the same car with me. He had the appearance of a miner, but on making his acquaintance I was surprised to learn that he was an electrician. It seems that he made a specialty of installing battery and induction coil outfits for charging wire fences with electricity. Down in Texas there are thousands of miles of barbed wire fence on the ranches which serve the purpose of keeping the cattle in bounds quite successfully, except when there is a stampede. Then they go through the fences like a landslide. This electrician found, so he said, that a fence charged with electricity would stop even a stampede. He told me he had fixed up over 500 miles of fence, but that the interruptor he used wore out too fast and he was going East to see if he couldn't get better apparatus for charging fences."

"It isn't a tax on street electric railways that is going to ruin the electric street railway business. A speedier death than that by taxation awaits the whole system of electrical appliance as operated at present," writes Eugene Field, the western poet, who assumes the role of a prophet for this occasion. "We have information which leads us to believe that within 12 months a new machine capable of use for providing transportation, light and heat will be put before the public; that this machine will controvert the 'principles of electricity,' which now obtain; will revolutionize all railway and other transportation systems; will do away with fuel, gas and smoke; will, in short, give humanity undreamed of advantages at a very moderate price. Yes, within the next twelvemonth we are going to see some very wonderful happenings."

Down in Richmond, Me., there is a local institution known as the Bug Line Telegraph Company, which is managed by young men with the same business tact that characterizes the larger companies. At present the company has about 20 offices in town and new ones are constantly being added. It costs about $7 to put in the necessary apparatus and connect with the main line.

"My partner and I were going for an important contract," remarked an electrical contractor, "and as we were crossing the street to the office of the man we hoped would give it to us, my partner picked up a shoe, saying that he would take it along for good luck, as that was what horse shoes were made for. He wrapped it in his newspaper and lugged it along. We didn't get the contract, and as we were going up the street he hauled the shoe out of his pocket and was about to throw it away in disgust. I stopped him and examined the shoe. It was a mule's shoe and had hoodooed the contract."

Electric welding has been used to remedy blowholes in defective castings by first drilling or chipping out the defects and then heating the casting around the blowhole in a gas or oil flame blast. Scraps of steel are then introduced, and the electric arc is applied to melt them. The result is said to be a perfect joint, without seam or flaw of any kind.

While in charge of Salenmyo Telegraph Office, U. B., says a writer in an exchange, an intelligent Sepoy one day came in and handed me a message to send to a station in Central India.

Having read the message, I told him there was something wrong.

"No, sahib; no, sahib; me knows English," he protested.

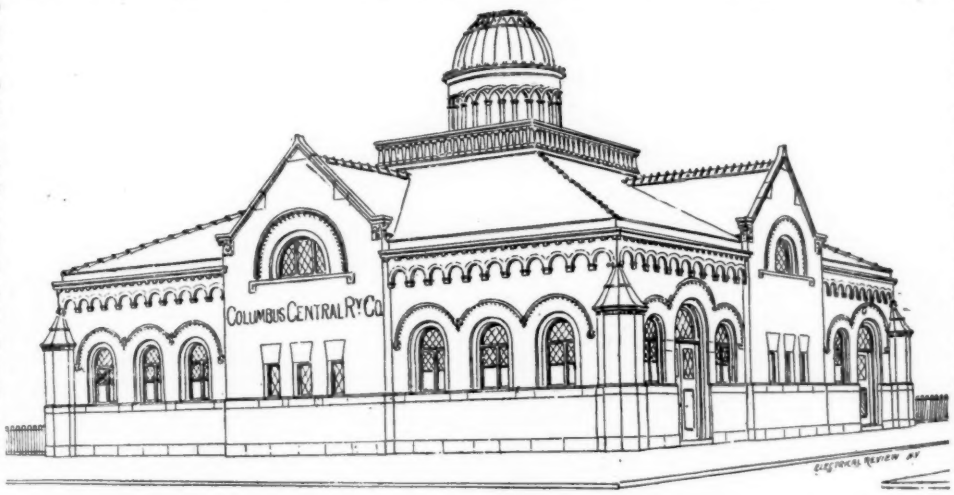
Again I attempted to explain to him that it was worded wrong.

"Me knows English," he declared, haughtily and indignantly. "If you no send, me report to superintendent, Mandalay."

Thus threatened, I forwarded the message as under:

"Come quick; father dangerously dead."

"Draught?" ejaculated the salesman who was trying to sell an electric exhaust pan to a shop-keeper. "Draught? Why, of course it'll make a draught. Sold one to a man over here in Vesey street, and it sucked the hot air out of his store to such an extent that it peeled the paper right off the ceiling. Fact. Had to paint the ceiling to keep it looking decent. Draught!"



THE COLUMBUS CENTRAL RAILWAY COMPANY'S NEW POWER HOUSE.—A PROGRESSIVE DEPARTURE IN ARCHITECTURAL EFFECTS.

A NEW DEPARTURE IN ELECTRIC RAILWAY POWER HOUSES.

A HANDSOME AND ARTISTIC STRUCTURE AT COLUMBUS, O.

The Columbus Central Railway Company, of Columbus, O., is taking a decided step in advance of the times in the construction of its power house on Cleveland avenue, in that city.

Heretofore architects or engineers have endeavored apparently to make the power building look as much as possible like a manufacturing plant, with massive looking walls and plain truss roof affording the time-honored gable at each end. These buildings have in many cases been erected in locations where they are incongruous and out of place. The tall and unsightly smokestacks belching forth clouds of black smoke have been commented upon severely. There has been little or no effort to make the building look attractive and architecturally a picture.

The Columbus Central Railway Company, however, under the able guidance of its constructing and consulting engineers, Barry & McTighe, the well-known New York firm, determined to make a bold move and construct a power house which, while possessing every latest modern feature pertaining to high efficiency and adaptability to the material requirements, will also be something unique as to architectural design. That the union of these objects is successful is seen by the accompanying illustration, which, however, but faintly expresses the *tout ensemble*.

The structure will be a hundred feet square, with pyramidal roof having each side a large dormer. The roof rises to a central gallery, surrounded by a balustrade, the surface being of heavy skylight glass nearly 700 square feet in area. From the

center rises a steel dome 20 feet in diameter and 23 feet above the gallery. The dome is ornamental in character, is used as a ventilator, and at the same time conceals the smoke-stack. The latter rises at the center of the building to within a few inches of the dome cresting, and a series of openings with rain-hoods from within the dome cause a strong upward draught to be produced on the air inside the whole building. The roof structure is of steel covered with heavy yellow pine sheeting and corrugated iron. The walls are of cut stone and red and terra cotta press brick with cut stone trimmings. Whatever exhaust steam is not utilized will pass up within the dome and into the stack near its top. The interior to a height of about eight feet will be faced with white enameled brick, and above that with cream-colored brick.

Westinghouse, Church, Kerr & Company have the contract for the entire power plant, except the boilers, and are determined to make this a very complete exponent of the principles of mechanical draft.

The plant will start at about 800 horse-power, to be afterwards increased to 2,500 or 3,000 horse-power. Westinghouse compound non-condensing engines, direct coupled to Westinghouse generators, steam separators and steam loop, with an elaborate switchboard, will occupy the generator room, and in the boiler room will be placed the Stirling boilers, economizers, exhaust fans, driving engines, pumps, feed water heaters, coal pockets and coal handling machinery. Murphy automatic smokeless furnaces will maintain the beauty of the building by avoidance of soot and smoke. Everything is aimed towards the cheapest possible production of power, under the local circumstances of the case.

The building will be completed and the plant in operation before October, and will be a striking and most interesting departure from the ordinary practice. We shall refer to the plant more in detail later.

The Telephone Can Help the Overworked Newspaper Men.

Some spicy reading notices have appeared in the New York dailies lately to the effect that the Metropolitan Telephone Company has reduced the rate to the small users of the telephone, such as physicians, residences, etc., $100 to $150 per year, according to use. The newspaper people should avail themselves of this privilege, for it is a well-known fact that many of the overworked journalists of this city might get away an hour or two earlier if they could keep in touch with their offices. The makers of newspapers in the West have been more keenly alive to the great advantages of the telephone than we have been here in New York. Not one of the great western dailies but what has the new perfected system throughout its entire building. Only three of the New York papers are thus equipped.—*The Fourth Estate.*

SOME FACTS ABOUT POLYPHASE MOTORS.

READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, PHILADELPHIA, MAY 18, 1894, BY LOUIS BELL, PH. D.

In connection with the long-distance transmission of power, most engineers will, I think, agree with me in the position that alternating current motors of some kind, and of alternating currents, preferably the polyphase variety, are almost a necessity. We have been forced to their use by the exigencies of long-distance service, which compel either the total abandonment of continuous current or its use under very embarrassing conditions.

There has, however, been a tendency to look upon the polyphase motor as a somewhat undesirable resort to which we have been driven by long-distance work. Such, indeed, was my own belief from *a priori* reasoning, and before I had obtained that practical knowledge of the subject which can only come from personal experience both with the design and application of any class of apparatus. By such experience, and by the commercial demands which have been coming in with steadily increasing frequency, I have been forced into taking the position that the polyphase motor is intrinsically preferable to the continuous current motor for a vast majority of all the uses to which such machinery may be applied.

At present, appearances indicate that not only will the polyphase motor displace direct current apparatus for most long-distance transmission plants, but will prove a formidable competitor in all applications of motors to industrial purposes, and this, although the polyphase apparatus is the growth of only a few years, while the direct current motor is the outcome of more than a decade of experience.

We may then, in instituting a comparison between polyphase and direct current motors, consider the various properties which a good motor of any kind must necessarily have. Mechanically speaking, we would all agree that it should be simple in construction, strong, not liable to frequent or considerable repairs, convenient in form and not excessive in weight. As regards its properties, it should in general run cool, stand over-loading without serious danger, run at a nearly constant speed, or be capable of considerable variation in speed if necessary. It should be capable for certain uses of sudden and violent exertion and of easily changing its direction of rotation. In a purely electrical way it should be simple, efficient both at high and low loads and should not take excessive amounts of current either in starting or in running.

This represents a difficult list of conditions to fulfill with any one motor, but I believe they can be met better by polyphase than by direct current machines. A direct current motor, for instance, of a given construction and reasonable weight cannot both run at a constant speed independent of load in a particular case and at the same time be capable of running at a wide variety of other speeds. It usually will not stand considerable over-loads without sparking, and at the same time give a fair efficiency at low loads; and so one might go on piling up difficulties. The polyphase motor, too, cannot meet all these conditions with equal success, but examining them one by one you will find that on the whole we can obtain very excellent results.

Taking up seriatim the desirable properties which I have enumerated and applying them to polyphase motors, we find as regards the first count that their construction is singularly free from complexity. They consist in general of two concentric masses of laminations forming respectively the field magnet and armature. The armature is assembled on its shaft much as in direct current machinery, while the field laminations are held together by a clamping spider of very simple construction. The bearings are supported either on end spiders fitted to the field spiders by lathe work only, or on pillow blocks of the ordinary kind. Commutator and commutator connections there are none, nor should there be collecting rings except in rare instances. The armature need be exposed only to low voltages, and should preferably be wound with a comparatively small number of rather massive conductors, united at the ends either by a single plate or by very simple connectors; the latter form being preferable. The field winding is usually in a greater number of coils than is a direct current field winding, but each coil has a comparatively small number of convolutions, making the total winding by no means complicated.

In lieu of the starting rheostat of the direct current motor, we have a starting resistance which should preferably be placed within the armature, and consists of a few zig-zags of metal united at one end and connected at the other to three or more contact pieces. A solid collar short-circuiting these contacts and a forked lever to move the collar completes the equipment, as I am accustomed to employ it. Its most noticeable feature is that the revolving armature, the most troublesome and delicate part of a direct current machine, is free from complication, and that it is almost as solid as if it were a solid mass of metal, and scarcely more liable to injury.

This very obvious simplicity of construction and mechanical strength is strong evidence of unusual freedom from repairs, and as a result of experience I have found that the induction motor is singularly free from liability to accidents of every kind. I have never succeeded even by the severest kind of experimental work in burning out a field coil or doing any serious injury whatever to a motor, although I have kept some of them on static torque tests in rapid succession for hours at a time and have held them at rest and poured current through them until the leads burned off, the motor still remaining undamaged. If there is a test of extraordinary severity that I have not applied to induction motors, I have yet to learn of it. These properties are invaluable in commercial work, inasmuch as they practically remove the danger of crippling the motor even under exceptionally unfavorable conditions.

As regards the convenience of the form of polyphase induction motors, I think an inspection of any of the types which have been brought out will render argument unnecessary.

The magnetic necessities of the case have led all makers of such apparatus in this country and elsewhere to adopt a species of barrel shape as the general outline of the motor, modified only in the proportions of diameter to length and in the adoption of one form or another of bearing. The tendency of this construction is to bring the center of gravity of the machine very low, thus insuring unusual stability and freedom from general vibration. This form, too, enables one to place the motor in almost any position which is convenient in applying it, upside down, as a side bracket, and the like.

The largest installation of induction motors in the world, just put in operation in Columbia, S. C., aggregating over 1,200 horse-power, is composed of inverted motors with their bases bolted to the ceiling timbers of the rooms.

As regards weight the abolition of any sparking limit to the output, and the excellent magnetic materials used, might naturally be supposed to lead to motors of unusually light weight, and such is in fact the case. Sixty to 70 pounds per horse-power in motors of moderate size is a figure easily reached without any sacrifice of efficiency, and if occasion requires these limits can be passed with great facility, 25 to 30 pounds of material per horse-power being quite attainable in large units, while still retaining satisfactory general properties. I must say, however, that for most uses I do not consider extreme lightness either necessary or desirable, although it is important to be able to secure it if necessary. So much for the mechanical character of induction motors.

Electrically speaking, the case is just as favorable. Unless forced to a very large output per pound of weight, an induction motor will run quite cool, at a heating limit in fact below that of most direct current machines of similar weight and output. This advantage is mainly due to the very substantial character of winding which can be conveniently employed and to the fact that the winding is distributed so that the losses in the copper are not localized while the laminated character of the structure facilitates through ventilation. This freedom from excessive heating indicates that the polyphase motor can stand considerable overloading without any serious results and experience has shown this to be the case. The worst that can really happen is that the motor may fall out of synchronism when the load is sufficiently great, thereby blowing the fuses in the primary line.

As sparking is obviated in this type of machine it can readily be rated at such output as will give a proper limit of heating, and this output will in most cases allow from 30 to 60 per cent of overloading before the machine will drop out of step. A wider range than this can be obtained if desirable, which it is generally not.

The limit of possible overloading fixes in a general way the possible static torque that can be obtained from a given machine, and this is apparently purely a matter of convenience in design, anything that can reasonably be required being quite attainable. There is no special difficulty in arranging polyphase motors for a starting torque four or five times the running torque, although this would be unnecessary except for severe hoisting and tramway work. At running torque the starting current taken may readily be no greater that the running current. From this it will readily be seen that a properly planned polyphase motor is easily of very great and violent exertions in a case of necessity. It will even endure complete reversal under full load within 10 or 15 seconds on motors of ordinary sizes, this time being sufficient for the machine to pass from full load in one direction to full load and speed in the other direction. This reversal is, as is well known, accomplished simply by reversing any two of the primary wires, the effect being to rotate the field in the opposite direction from the armature, thus causing an enormous rate of cutting lines of force and consequently immense effort causing the motor to stop and reverse.

SPEED VARIATION IN POLYPHASE MOTORS.

This subject has been for the most part in a rather hazy condition up to

the present time. The induction motor has been generally known as non-synchronous, and such indeed it is. The name, however, has been frequently used in ignorance of the fact that an induction motor always tends towards synchronous running.

Under ordinary conditions the polyphase induction motor can be made to run at nearly constant speed independent of load, resembling in this respect a well designed shunt motor. A variation from no load to full load of five to six per cent in speed would represent ordinary good practice, either in a shunt motor or a polyphase one, this limit being exceeded only in small motors or types which may be regarded as special. It is by no means difficult, however, so to design a polyphase motor that the speed shall possess very remarkable uniformity. This condition has been valuable in the Columbia plant previously alluded to. In this case tests of 17 motors showed a maximum variation in speed, from an output of 75 horse-power to friction load of the motor, of only 2.2 per cent, individual motors showing slighter variations down to one and one-half per cent.

The task of these particular motors is driving a cotton mill, hence the necessity for uniform speed. And this uniformity in speed is not greatly affected by variations in voltage, which would be quite sufficient to cause considerable speed variation in a shunt wound motor; in fact the induction motor is remarkably insensitive to moderate variations in voltage, unless it is heavily loaded.

This uniformity in speed has frequently been urged as an objection to the induction motor, barring its employment in cases where speed variation is necessary. This point is not well taken.

The induction motor cannot be made successfully to run at reduced speed by varying the primary voltage. Under these circumstances the output of the machine falls off somewhat more rapidly than the square of the voltage, so that only trifling speed variations are possible. It is a fact, not generally known, however, that the speed of a polyphase motor can be varied with the same facility and within the same wide range as is possible in the case of a series wound continuous current machine, such as a railway motor. This is accomplished in the induction motor by a rheostat in the secondary circuit, just as it is accomplished in the series motor by a rheostat in the main circuit. Thus equipped the two machines behave almost exactly alike. The speed at constant torque can be made to vary from full speed down to almost no speed, thus simulating the action of the series motor in the closest possible fashion. At any given speed an increase or decrease of the torque will decrease or increase the speed substantially alike in both classes of motors. In both, too, the efficiency is initially similar and falls off in practically the same ratio. A non-inductive resistance is necessary in case of the polyphase motor, an inductive one throwing the armature current so far out of phase as to interfere with the proper action of the motor.

Fig. 1 gives an excellent idea of the behavior of a polyphase motor with resistance in the secondary circuit.

Curve A shows the speed and output of a certain motor under these circumstances. It was a four-pole machine operated at 50 cycles per second and the initial speed was reduced to 1,400 by the resistance of the leads reaching across the room to the rheostat composed of loops of manganin strip which would be systematically varied. It will be seen that the word curve is almost a misnomer, the ratio between the speed and output at constant torque being almost a linear function, even when the speed fell to as low as 150 revolutions per minute. It was not carried lower than this only because of lack of adaptability in the rheostat. No series motor could show a more satisfactory result.

Curve B shows the power factor under these varying conditions. It is high at all loads and speeds, varying slightly with a maximum at about half speed.

Curve C shows the variation in current. This, as can be seen, is

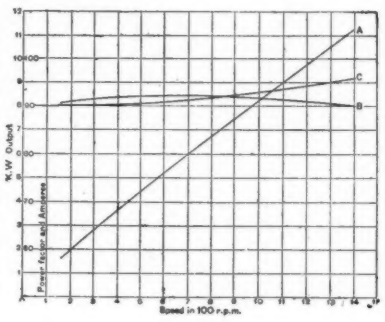


FIG. 1.

almost constant, falling off slightly at the lower speeds, the voltage being uniform throughout the test.

Speed variation by this method is not as efficient as might be wished, but still compares favorably with that obtained in a series motor with rheostatic control. Some modified methods of control promising a somewhat better efficiency have been suggested, but it seems probable that in the net result we shall find that continuous current and polyphase motors are about on a par in this respect. It should be noted that in continuous current motors speed variation by weakening the field is only practicable within a very limited range and requires an abnormally heavy motor. I think that with a similar change in design the polyphase motor could be made to operate nearly as well by change in its field strength. An efficient speed variation through a very wide range is attainable in either class of machine only by extraordinary means, as an elaborate combination of direct current machines, or frequently changing devices in the polyphase machines. From what has been said it will be apparent that the polyphase motor is perfectly capable of a complete control of speed on the same terms generally obtained with continuous current motors.

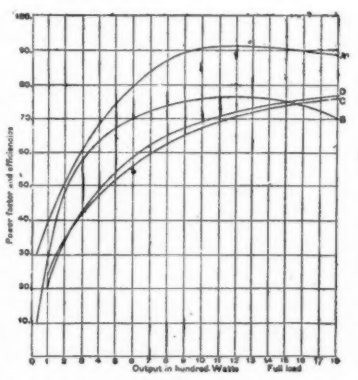


FIG. 2.

COMPARISON OF A POLYPHASE AND CONTINUOUS MOTOR.

Fig. 2 gives a striking comparison between the properties of the two classes of machines under consideration.

The polyphase motor selected for comparison is of the two horse-power output, representing the average small motor to be found in central station practice. This particular size weighs 218 pounds complete, and runs at a speed of about 1,400 revolutions per minute on 50 cycles loaded. It is relatively neither better nor worse than polyphase motors of other sizes, as may be seen by reference to the curves in my previous paper on this general topic. The power factor in this case rises quite sharply, reaching 86 per cent at half load and through most of the working range of the motor remains at or near 90 per cent, nearly 91 per cent as a maximum. The efficiency has its maximum a little under full load of the motor and reaches nearly 77 per cent, being 75 per cent at full load. Both power factor and efficiency hold high values from half load up and do not fall off seriously until some distance below half load.

Contrast with curves A and B belonging to the polyphase motor curves C and D; the former is the efficiency curve of a two horse-power 500 volt motor of one of the well-known American makes, and curve D is a similar curve for two horse-power 110 volt motor of European manufacture. These are not selected curves but were the two completest available. Both these curves, C and D, show remarkable similarity. Neither of the motors sparked seriously at full load, the load limit being set rather by the heating. Both curves rise slowly and attain their maximum values at some point beyond the available load of the machine. At full load the efficiency is substantially the same as that of the triphase motor. At low loads it is noticeably worse. I think C and D are fair average machines. In tests of a wide variety of motors, some higher and lower efficiencies would be found. Such, too, would be the case in testing

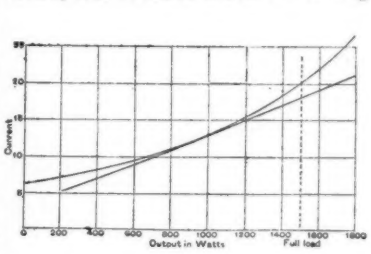


FIG. 3.

a variety of polyphase motors. In fact the mate of the triphase motor shown, sent through the factory at the same time, showed about one and one-half per cent higher efficiency, but a complete test was not attainable, as the machine had to be immediately shipped. A comparison of these curves will render it evident that it is quite practicable to produce a polyphase motor having an efficiency fully equal to that of direct current motors of similar size, and I think the tendency will be towards better efficiency at moderate loads. It should be mentioned here that the two horse-power triphase motor was made of ordinary good armature iron, not selected or specially treated in any way.

Finally let me call sharp attention to curve 3 which shows the effect of the power factor, which I regret to say has been talked about not wisely but too well in most of the discussions pertaining to polyphase apparatus. Two curves in Fig. 3 show the total current in the line in the two horse-power triphase motor and the 110 volt continuous current motor above mentioned. The current curve of the continuous current machine is nearly a straight line; that of the polyphase machine is almost tangent to it and slightly concave upwards. A noticeable fact displayed is that throughout the ordinary working range of these two motors the currents were substantially equal, the existence of the power factor in the polyphase motor being only noticeable at very low loads and at overloads. This comparison should be a sufficient answer to the charges of excessive current that have so often been made against the polyphase machines. In a bad polyphase motor they would have foundation, in fact. In a rather good one the net effect of the lagging current is trifling. It should further be noted that the current in this triphase motor at friction load is only about 30 per cent of the current at full load, and of this only 30 per cent represents loss of energy. This is in marked contrast with the results obtained from a foreign triphase motor of similar size exhibited at the World's Fair, in which the no load current was nearly equal to that at full load and the power factor at full load was barely 50 per cent.

In this brief discussion of some of the properties of modern polyphase motors, I have endeavored to show how nearly they fulfill the conditions which may be regarded as desirable in electric motors in general. That they do so as well, if not better, than the continuous current machines of similar capacity I believe that I have satisfactorily shown.

The demand which certainly is arising for polyphase motors for general power purposes based on their intrinsic merits indicates that the older type of machinery has found a dangerous rival, all questions of long-distance transmission aside.

Boiling Water Didn't Stop Bridgeport Trolley Workmen.

There was a clash between the Bridgeport, Conn., Traction Company and the Consolidated road on July 26. The charter of the Traction company gives them permission to cross the tracks of the Consolidated road. The Railroad Commissioners have also said under what conditions they can cross the tracks. Despite this the Consolidated road threatened to resort to force if they attempted to lay the tracks. The employés of the Traction company started to work at the Main street crossing. Orders were at once given to run locomotives to the scene of the work. An immense crowd gathered, and the men in charge of the engines began to pump boiling hot water on the workmen. The work was carried on, however. There was danger of more trouble, and extra police were called. The engineers and firemen were arrested.

The Mule Hangs on in Kentucky.

The Bowling Green Street Railway Company has changed hands again. It has been leased to George and Clarence Claypool, two very enterprising young gentlemen of that city. The street cars of Bowling Green hauled something less than 62,000,000 passengers last year. In fact, the number was considerably less. The company which owns the line has failed to make anything out of it. The stockholders refused to adopt electric instead of mule power and rapid transit is something unheard of in the Park City.—*Louisville, Ky., Times.*

Waring Electric Company.

Ex-Mayor Wm. W. Hyde, of Hartford, has been appointed permanent receiver of the Waring Electric Company, of Manchester, Conn., which formerly made the "Novak" incandescent lamp. The receiver gave a $25,000 bond.

Hertzian Waves in Laboratories and Electro-Plating Works.

Professor Elihu Thomson has sent the following communication to the London *Electrician:*

In the issue of your valuable paper of June 8, 1894, under the heading "Hertzian Waves at the Royal Institution," you take occasion to remark: "It is wholly probable, as Dr. Lodge suggests, that Hertzian waves may often have manifested themselves in physical laboratories to the annoyance of the workers," etc.

I may mention in this connection that in 1877, if I remember the year correctly, while working a Ruhmkorff induction coil, one terminal of which was grounded, and the other terminal of which was attached to an insulated metallic body, Professor Houston and I noticed that when the sparks were passing between the terminals of the coil, it was possible not only to obtain minute sparks from all metallic bodies in the immediate neighborhood—that is, in the same room—but that delicate sparks could be taken by holding in the hand a small piece of metal near metallic objects in many other rooms and on different floors in the building, although the pieces were not connected to ground. These could only have been Hertzian effects, but there was no recognition of their true character at the time, though the effects were seen to be connected with the very quick charging and discharging of the insulated body. An account of these experiments was, I think, published in the journal of the Franklin Institute at the time.

I desire also to mention, as coming under my notice within the past year, a curious and rather amusing illustration of the principle upon which the beautiful instrument for detecting the presence of electric oscillations, devised by Dr. Lodge, and called by him the "coherer," is based. It was reported to me when in Philadelphia that a certain electro-plater had found that he could not pursue his silver-plating operations during thunderstorms, and that if he left his plating over night and a thunderstorm came up the work was invariably ruined. I was disposed to be thoroughly skeptical, and expressed my disbelief in any such effect. Being urged, however, I went to the silverplater's shop, which was a small one, and questioned the silverplater himself concerning the circumstance which had been reported. While it was evident that he was not a man who had informed himself electrically, I could not doubt that, after conversation with him, he had indeed been stating what was perfectly true—namely, that when his operations of plating were going on and a thunderstorm arose, his batteries, which were Smee cells, acted as though they were short circuited, and the deposit of metal was made at too rapid a rate. The secret came out on an inspection of his connections. The connections of his batteries to his baths were made through a number of bad contacts, which could not fail to be of high resistance under ordinary conditions. I could readily see that virtually he was working through a considerable resistance, and that he had an excess of battery power for the work. Under these circumstances a flash of lightning would cause coherence of his badly contacting surfaces, and would improve the conductivity so as to cause an excessive flow of current, give a too rapid deposit, and, as he put it, "make the batteries boil." The incident suggests the use of Dr. Lodge's ingenious instrument in the study of the waves which are propagated during thunderstorms, of which waves we have practically little or no information.

Was It the Cat?

The efficacy of a black cat as a lightning rod has been too frequently the subject of discussion and assertion to be treated at length at the present time. An illustration of this popular belief can be deduced from an incident that occurred on the evening of the Fourth of July to the wife of a well-known business man of Washington.

The young matron had been expending considerable time and attention upon a handsome black cat, which she continued to stroke, notwithstanding the assertion of her family that by so doing she was charging herself with electricity. Finally, after dark, she decided that a pleasant way of winding up the evening would be to go for a ride on the electric cars to Bethesda. Accordingly, inviting two of her friends to accompany her, she set out for the ride in high spirits. The trio found places together near the middle of the car and had gone a short space beyond the power house, when their conversation was interrupted by the conductor hurriedly bending over them as though to avert some catastrophe from beneath, and telling them to leave the car with all speed, as it was on fire. Scarcely had they left their seats before a sheet of flame burst through the floor just under the very spot over which the young matron had been sitting, the apparatus beneath having ignited at that very point. She declares she will never stroke another cat.—*Washington Post.*

Steam and Electrical Carriages in Germany.

In Berlin there are several electrical victorias which take their owners in and out of the city every day. They have been built by German electricians, have storage batteries, and are guided by a man who sits in the driver's seat. In Paris there are also three or four steam and electrical carriages which are permitted by the authorities of the city to travel over the streets and boulevards of that town. They apparently work with entire smoothness and certainty, roll along swiftly, and only frighten a small percentage of the horses. In New York city there are two electric carriages which occasionally arouse the sightseers on Fifth avenue and in Central Park; but there is no demand for conveyances of this kind from the general public.

NISSL'S AUTOMATIC TELEPHONE EXCHANGE.

AN INGENIOUS SYSTEM INVENTED BY AN AUSTRIAN TELEGRAPH ENGINEER.

Mr. F. Nissl, a well-known telegraph engineer of Vienna, has recently developed an automatic telephone exchange which, according to trustworthy information from Vienna, is a vast improvement over former inventions in the same line. To enable the readers of the ELECTRICAL REVIEW to form an intelligent idea of Mr. Nissl's invention, we will enumerate briefly the advantages ascribed thereto, and then enter into the details of the mechanism.

An automatic telephone exchange has long been considered a desideratum by many American and European experienced telephone engineers, while other luminaries of the telephone ilk have not failed to throw cold water on all attempts at automatic exchange work. They contend that a trustworthy automatic telephone exchange is but an electric *fata morgana;* that mechanical devices can never compete with human intelligence; that such apparatus, to give even a modicum of satisfaction, must be of the best possible workmanship, which is equivalent to a large investment of capital; and that, though such systems claim to dispense with the services of operators, this is but a sweet delusion and snare, for the necessarily complicated mechanism requires the constant care of highly skilled labor with a remuneration more than equal to that of two or three cheap telephone operators.

Without entering into this discussion of old standing, it is evident that an "automatic exchange" need not be an *entirely* automatic apparatus, dispensing altogether with an operator's service. An exchange may be called "automatic" which contains apparatus whereby a number of subscribers, forming a group, are represented in the central office by contact points arranged on a constantly revolving disk, which contacts, by means of springs gliding over contact strips, put each of the subscribers at predetermined periods in connection with the central office. Among the prominent United States inventions in this branch of telephonic work are those of Gilliland village exchange system, United States Nos. 306,238, 306,239, 306,240; I. H. Farnham, United States Nos. 375,543, 375,544; Wm. B. Van Size, United States No. 393,529, and others. The Gilliland village exchange system, as may be remembered, was in operation at Leicester, Mass., as early as the Summer of 1885, where it was exhibited to the members of the telephone convention in September of the same year. After several years of trial, it was finally abandoned in 1890.

The advantages of Mr. Nissl's system are described as follows:

1. A large number of subscribers are served by a single line.
2. The central can call the subscriber, and *vice versa.*
3. Subscribers belonging to a group can neither interrupt a conversation started by another subscriber of the same group, nor overhear conversation.
4. A minimum of auxiliary devices is required at the central.
5. There is no additional apparatus at the subscriber's station.
6. Subscribers cannot use the line to the detriment of subscribers of the same group.
7. It is easy to arrange the apparatus to permit short or extended conversations.
8. A great saving in line wire and additional switchboard construction. A small board may quickly be arranged to serve a large number of subscribers, which is equivalent to a considerable saving of money.
9. Centralization of the entire service.
10. Great efficiency and reliability of service, the mechanism producing audible signals when the line is unoccupied.
11. The use of the invention does away with *any* form of busy test; a great labor and money saving, whereby many miles of busy test wire are avoided in the construction of a switchboard, preventing also electrical disturbing phenomena.
12. All subscribers enjoy equal exchange facilities.
13. The apparatus automatically informs each subscriber that his allotted time for the use of the common line will run out presently.
14. The apparatus prevents inductive disturbances which cause cross talk, for whenever a subscriber uses the line all the other subscribers of the same group are cut out.
15. By means of the automatic apparatus subscribers of groups belonging to different exchanges can communicate with each other without the intervention of any central.
16. The apparatus ensures the greatest possible efficiency in exchange work.
17. The absence of delicately adjusted polarized relays and synchronously operated clock mechanism.

Referring to the subjoined diagrams, Fig. 1 shows a line radiating from a central to the automatic commutator K, which is connected with any number of subscribers forming a "group." Figure 2 is a plan view of the connections between a central and group, and Fig. 3 shows the connection of two groups belonging to different exchanges.

The principles underlying Mr. Nissl's system embody the following features: Upon a cylinder, kept in constant rotation by any suitable driving mechanism, there are first two contacts representing the common exchange line and a number of others representing the line of each subscriber. By the rotation of the cylinder, these contacts are alternately closed and opened at predetermined intervals. Both the central station operator and subscriber can ascertain immediately whether a given line is open or closed, and thus the central need not call a subscriber in vain, nor a subscriber the central. Again, the exchange, as well as the subscriber, can never use the line longer than the predetermined length of a conversation. Either acoustic or visible signals may be employed for the information of the subscriber concerning the conditon of line.

In Fig. 2 the group consists of four subscribers (I–IV), connected to the commutating switch by metallic loops. As a matter of course, earth can be used for the return conductor. As shown, cylinder W has contacts c c^1 for the common line and two contacts for each subscriber's line, marked respectively c_1 $c^1{}_1$ c_2 $c^1{}_2$ c_3 $c^1{}_3$ c_4 $c^1{}_4$. This duplication of contacts prevents the possibility of overhearing a conversa-

tion. When the cylinder revolves, contacts $c_1 c^1_1$, etc., are simultaneously connected to their corresponding springs $f_1 f^1_1$, etc.; likewise c_1 c_2 c_3 c_4 contact with c, and c^1_1 c^1_2 c^1_3 c^1_4 with c^1. If the cylinder makes one complete rotation within a minute, each subscriber's line is joined to the common exchange once during that time.

To enable the subscriber to ascertain quickly the position of the cylinder contact, it is connected with a disk or drum T having a number of projections or cams, i_1 i_2 i_3 i_4 upon its periphery, which, as the disk revolves, throw metallic tuned tongues into vibration. These vibrations are in turn electrically transmitted to the microphone M, energized by battery B. Included in its circuit is the primary of induction coil J^1, respectively J. These signals are distinctly heard in the operator's and subscriber's telephone set.

As shown in Fig. 2, each subscriber has a return conductor to ascertain quickly the condition of the line, but, if desired, such return conductor may be dispensed with. Now, as the return conductor passes sequentially through the telephones l^1_1 l^1_2 l^1_3 l^1_4, it is evident that each subscriber hears not only the various vibrating tongue signals, but also the low humming sound produced by the rotation of the cylinder; in other words, he knows at once whether or not the mechanism is in operation, or has been stopped, and conversation is going on. The listening-in on the part of the subscriber is done by lifting up the receiving telephone, supported on the non-movable hook. Of course, the extra line conductor may be omitted, and the system operated with a single line to the subscriber and earth return.

The method employed for the arrest of the cylinder is as follows: Looking at the diagrammatical drawing, it will be observed that there is an electro-magnet E in the common line which has an armature bearing a movable prong g, which is enabled to arrest the pivoted lever H. Preferably alternating currents should be employed to operate the electro-magnet E. As soon as H falls into g, its toothed end arrests wheel S, which in turn prevents the further rotation of the commutating switch W. According to the prearranged time allowance for a conversation, lever H must be lifted out of contact with E every three or five minutes, permitting W to resume its rotation.

The raising of lever H is accomplished by means of a second motor mechanism, set in motion by the descending of lever H. This is indicated in Fig. 2 by excenter e, which is connected to the motor mechanism.

It is immaterial whether E is placed in a special conductor, as shown in the diagram, or included in the listening-in conductor. Both arrangements are advantageous, because they prevent the central office from arresting the commutator W; thus there can be no loss of operator's time caused by calling absent subscribers.

As soon as the commutator is arrested, the microphone circuit which was closed during the rotation of W by means of springs o and p, is interrupted. The circuit is, however, closed the moment that excenter e raises lever H. This is accomplished by the rotation of arm d, which makes one complete rotation each time W is stopped; it also unites temporarily springs m and n, thereby closing a circuit through battery B or B_1 and operating the circuit breaker U.

Again, as this circuit also includes the primary of induction coil J^1, it is evident that the makes and breaks of U will be heard in all receivers connected to the listening-in conductor. Such circuit arrangement serves a two-fold purpose: First, by the low noise in the receivers, the talking subscribers' attention is drawn to the fact that their time allowance is running out, and, secondly, a subscriber waiting for an opportunity to call central, is notified by the loud phonic call in his receiver that the line is at his disposal. To prevent a false alarm at other subscribers' stations, there is preferably a double-pointed switch at each station which may be turned either upon R or S. If turned upon R the listening-in circuit is entirely interrupted; in other words, if a subscriber desires to use his line he may simply turn the switch upon S and wait for the phonic call.

To prevent cross-talk, caused by static charges, the listening-in branch is completely interrupted whenever a conversation is proceeding. This is done by means of ten springs F, which are closed as long as W is in operation, but are opened or interrupted as soon as the second motor mechanism commences to work.

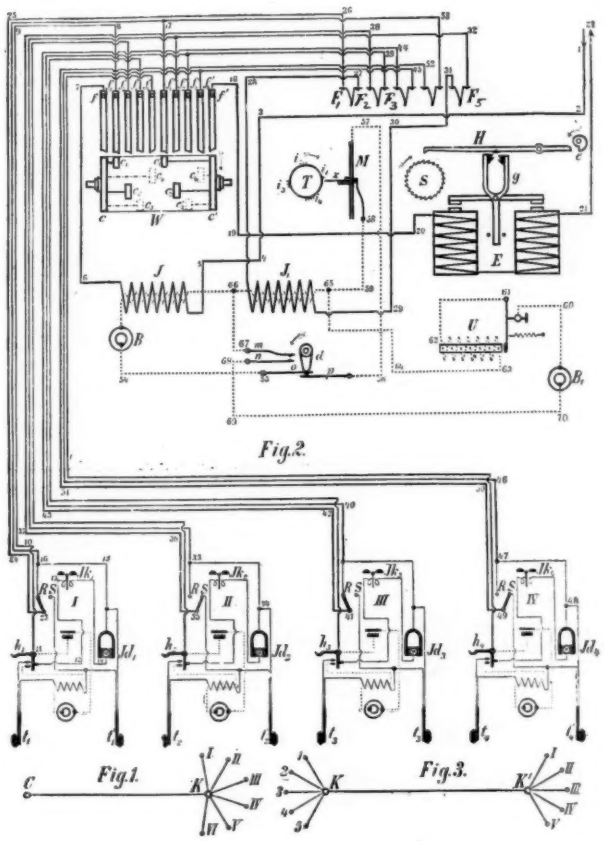


Fig.2.

Fig.1. Fig.3.

DIAGRAMMATIC CIRCUITS OF NISSL'S AUTOMATIC TELEPHONE EXCHANGE.

For this reason the inventor recommends leading the listening-in branch to each subscriber's apparatus.

Assuming, however, that there is no special listening-in branch—that the subscriber's apparatus is connected to the central either by a metallic loop or grounded line—and that the induction coil J has been omitted, it will be sufficient to include U in the primary of J. In this case the motor mechanism should be arranged to start upon the closure of springs m and n; consequently both motors continue to rotate until all subscribers have in turn received the phonic call. It is evident that lever H after the contact between m and n must be raised upon g to enable the subscriber whose turn is next to arrest W.

Fig. 3 shows two groups of subscribers connected by a common line, the commutating switch being at K and K^1. In this case the electro-magnets should be placed in a separate line. Subscriber 1 desires to call I. He listens for his signal, arrests the commutator W and listens in his receiver for the signal given by the rotation of K^1. Upon receiving the signal, denoting line I, he rings his bell; I, being called, in turn arrests K^1, and the two subscribers may converse without the assistance of the central.

Mr. Nissl has constructed a peculiar microphone, shown in Fig. 2, consisting of a carbon diaphragm, against which impinges a small knob of platinum. He claims that such a microphone, besides possessing great sensitiveness, is practically not subject to current fluctuations, so that the current from a Meidinger cell, working through 50 ohms resistance, is sufficient to operate it continuously for many months.

Microphone Circuit.—Starting from battery 54, 55 (m n being closed by d), thence along 56, 57, microphone 58, 59, 65, through the primary of J^1, 66 to the primary of J and back to the battery. All microphonic signals are heard in the telephones connected to the secondaries of J and J^1.

Circuit of Interrupter U.—Starting from B along 60, 61, 62, 63, 64, 65, through the primary of J^1, 66, 67 (m n being closed), 68, 69, 70, back to battery B^1. As long as m and n remain closed, the phonic signals are heard in the telephones connected to the secondary of J^1 while the signal is heard faintly in all telephones attached to the secondary of J; this constitutes the warning signal, informing talking subscribers of the speedy termination of the time allotted to them.

Operator's Call Circuit.—The operator listens in his telephone for signal representing subscriber 1. The line is through 1, 2, 3, 4, 5, the secondary of J^1, thence along 6, 7, spring f being in contact with $c_1 f_1$ 8, 9, 10, 11, 12, 13, through the convolutions of alarm bell Jk_1, 14, the short circuited inductorium Jd_1, 15, 16, 17, f^1_1 c^1_1 c^1 f^1, 18, 19, 20, the convolutions of E, 21, 22, back to the central. The operator, upon hearing the signal, rings subscriber 1; the circuit is the same, but the bell at the subscriber's station rings; the armature of E operates, lever H descends into g, arresting W. The same process is employed when the subscriber calls the central.

Listening-in Circuit.—The subscriber desiring to listen turns the switch on S and places the telephone, resting upon the non-movable support, to his ear. Starting with 1 the circuit is as follows: 23, 24, 25, 26 F_1, 27, 28, secondary of J_1, 29, 30, 31, F_5, 32, 33, 34, i_2, S, 35, 36, 37, 38, F_2, 39, 40, R, 41, 42, 43, 44, F_3, 45, 46, 47, 48, l^1_4, S, 49, 50, 51, 52, F_4, 53, 17, 16, back to R. Stations II and IV, having placed switch upon S, are enabled to hear the motion of commutator W and receive the phonic call.

Anglo-American Telegraph Company, Limited, vs. Compagnie Francaise du Telegraphe de Paris a New York.

In the ELECTRICAL REVIEW for July 25 was published a *resumé* of the long-protracted proceedings in the action brought by the English company against the French company, claiming damages for loss sustained in consequence of the rupture in 1887 of the "common purse" agreement made six years previously. The final judgment of the Court of Appeal has been given, as was anticipated, in favor of the Anglo company. The court held that the P.-Q. company should have sought the approval of the French Government before breaking the agreement, failing which it acted on its own responsibility and at its own risk. But as it was evident by the ministerial dispatch of May 21, 1891, that the French Government would not have given its consent to the fusion of the two companies, the Anglo company were only entitled to damages for any injury it might have sustained through the rupture for the period between December 31, 1886, and May 21, 1891. The court was not able itself to assess these damages, and, therefore, referred the matter to MM. Flory and Verbeecque and a third person yet to be chosen, to determine the amount to be paid as compensation to the Anglo company. The P.-Q. company are to pay all costs up to and including this judgment, the question of further costs being reserved.

The Stirling Water Tube Safety Boiler.

The Stirling boiler is one of the most popular among electric light and electric railway companies, and is deservedly meeting with great success. It has many special advantages and embodies the results of the best thought and experience of water tube boiler experts. It is made by the Stirling Company, whose general offices are in the Pullman building, Chicago. The company's shops and foundries are at Barberton, Ohio, under the care of Superintendent H. S. Pell. The officers of the Stirling Company are O. C. Barber, president; J. K. Robinson, vice-president; Thos. Deegan, secretary and general manager; and Edw. R. Stettinius, treasurer. John MacCormack, 126 Liberty street, is the New York sales agent for the Stirling Company.

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The electric fan and General Humidity are sworn foes.

We are told that some of the new safety fenders for trolley cars are so successful in their operation that people deliberately get in the way of the cars just for the fun of riding a short distance on the fender.

The various names given to the attendants at electrical conventions make a lengthy list. The latest is "Lightning Bugs," conferred by a St. Paul daily paper upon those who were at the recent meeting of the Northwestern Electrical Association.

HEAVY BONDING OF ELECTRIC RAILWAY RAILS.

With all modesty we believe the ELECTRICAL REVIEW can claim to have been the pioneer in the movement towards extreme heavy bonding of the rails of electric railways. Several years ago we began the crusade against insufficiency of conductivity in the return circuit, and charged it primarily upon the very defective methods of bonding then in vogue. We persisted in frequent attacks upon the evil practice, and gradually our efforts bore fruit. Railway superintendents and managers began to look into our statements and once investigation began the result was inevitable —our assertions and arguments were confirmed.

To-day a vast number of roads have either rebonded entirely or are now doing so, in consequence of the agitation long ago begun in the columns of the ELECTRICAL REVIEW. Rails which were once thought well bonded with No. 6 iron wire, are now furnished with as large as No. 0000 copper bonds, an improvement electrically of nearly 3,000 per cent. One road we know of is using two such large bonds at every rail-joint.

Our contemporary, the *Illustrated American*, prints this:

While one part of the world is proudly wagging its head over the improvements in electric lighting, another part of the world is discovering that the human eye is not so effective as it used to be. It is time that this question should be thoroughly examined by competent experts. There can be no doubt that the average person injures his eyesight by using naked electric light. Any layman knows enough to tell that. If the light is shaded sufficiently to protect the eyes, one-half of the current is wasted. It is probable that the children of the present generation will show the effects of the shock given to the eye by electric light.

We would inform Editor Creelman that there are all kinds and styles of shades for electric lights that do not "waste half the current."

We would remind the officers of the Northwestern Electrical Association that if they expect to receive their modicum of space and attention from the electrical press, proper facilities for obtaining the news of the meetings of the association should be provided for the representatives of the papers in attendance. The press arrangements at the recent St. Paul meeting of the Northwestern Electrical Association were conspicuous by their absence and it was with considerable effort that the proceedings of the convention, even in a meagre form, were obtained. This should not occur again.

The all pervading influence of electricity is everywhere apparent. You can scarcely pick up any newspaper, weekly journal or monthly magazine nowadays that you do not find some reference to electrical achievements or progress.

OUR BOSTON LETTER.

The foundations are being laid for the new electric power station at Norway, Me. A penstock will be constructed from the dam to the station, giving a fall of over 50 feet, and furnishing sufficient power to supply the neighboring villages.

The officers of the Board of Trade, of Woburn, Mass., are much pleased at the success of the effect to locate the new works of the Burton Electric Heating and Forging Company, at Mishawum station. The factory, which is a substantial structure 180x60 feet, is nearly completed and the machinery is being moved in and will be put in position as fast as possible.

The new line of electrics between Boston and Brookline is completed, and the West End company are now only waiting for the town to widen a part of the street and change the grade before putting the line in operation. New cars, known as the "Columbian Model," are to be used, differing from any now running in Boston. The windows are higher and the cars much lighter.

The Frank & Kilby Electric Company, of 185 Franklin street, this city, have succeeded the Day-Moberg Electric Company in the manufacture of the well-known "Jupiter" storage battery and fan motors, dynamos and small motors for various power purposes. They will also continue to manufacture a first-class primary battery, as well as Moberg's dental and jewelers' drills. The new concern are backed by ample capital, and the sale of their various specialties will be strongly pushed. Fred. E. Moberg is manager and Kilby P. Smith, treasurer.

Now that telephones can be bought outright and used to good advantage in replacing the old call boy system in large hotels, there is no doubt of their ultimate adoption and very general use. The new Hotel Majestic, corner of Seventy-second street and Central Park West, New York, will be entirely equipped with telephone service, and the National Telephone Company, of Boston, has received an order for 500 sets, or 1,000 instruments. The National instruments are particularly adapted for this class of work, and are meeting with a demand which taxes the facilities of the company to the utmost to supply.

The citizens of Boston, or rather a very small percentage of them, have expressed their views as to the rapid transit problem at the polls, and the special election has demonstrated one thing at least, and that is that the majority of those who took the trouble to vote are in favor of rapid transit. Considering the number of people interested and the immense interests at stake, it is surprising that the vote should have been so light, but this is partly accounted for by the fact that very few people have been able to sift intelligently the mass of talk for and against the scheme, and out of it all arrive at any positive idea of what would follow if the Meigs bill, so called, went through.

The fact that rapid transit is badly

needed in Boston is beyond question, as is also the fact that a large majority of the people want rapid transit. The leading question in the minds of most of them is not whether they want it, but whether, under the Meigs bill, they will get it. The subway scheme, which has been tacked onto the bill, is another point they do not understand and tends still further to increase their doubts.

There is no getting over the fact that much skepticism is felt and openly expressed over the whole scheme, and many people assert that it is a gigantic bluff gotten up for the lining of somebody's pockets.

The West End people regard the situation most complacently, and President Little sums up the matter and expresses the general feeling briefly by saying "The road is not built yet, and it may be a long time, perhaps, before it is." Strange as it may seem under the circumstances, West End stock has gone up several points since the result of the election became known, and at the present writing is still climbing.

As I said before, rapid transit, in the true sense of the term, is badly needed, and it seems a pity that the present plan, which is probably all they will ever get, has not more of the confidence of the public.

The Meigs people, and those interested with them, are highly jubilant, and assert that the road will be put through at once. One very important change seems to have occurred in their opinions as to motive power since I last talked with them. At that time I broached the subject of an electrical equipment and was told flatly that it was entirely impracticable, and that steam, and steam only, would be used. As a reason for this I was presented with several elaborately prepared estimates showing, or pretending to show, the comparative costs for electrical and steam equipment, by which it was figured out that to equip three 20 mile lines of road with electricity would cost $28,800,000 as against $2,520,000 for steam equipment.

These figures are absurd on their face, as any practical man could tell at a glance, and were gotten up to make the use of electricity as a motive power prohibitive. It now seems that their ideas have undergone a radical change, or they have come to a realization of the true facts of the case, as General Hyde, one of those most interested, states that "We intend to have the most modern thing in the shape of elevated railroads. We do not propose to have locomotives dropping their ashes and oil upon the heads of the people below. We intend to use electricity or compressed air to drive the engines." No doubt the traveling public and pedestrians as well, if the road ever does reach a state of completion, will appreciate the motives which led to this welcome decision. H. G. T.

Boston, July 28.

Some differences between a man and an advertisement are that the latter never sleeps, has no vices and doesn't know anything but its own business.

INSULATED WIRE TESTS.

THE WORLD'S FAIR COMMITTEE MAKES ITS REPORT—KERITE AND OKONITE LEAD—FIGURES IN DETAIL NOT READY.

The ELECTRICAL REVIEW gives below the awards made by the Committee of the World's Columbian Exposition to the manufacturers of insulated wires and cables. It will be noticed that there were an even half dozen competitors and the awards are made in the order published. The figures of the tests are not yet given out for publication by the committee. It is understood the tests were quite exhaustive and thorough:

W. R. Brixey, New York, N. Y.

GROUP 126; CLASS 769—INSULATED WIRE FOR ELECTRIC LIGHT SERVICE.

AWARD.

First. Highest excellence in insulating qualities.

Second. Durability of insulation under conditions found in commercial service.

Third. Uniform high excellence in mechanical qualities of insulation.

NOTE.—This report is based upon the results of exhaustive tests approximating the various conditions to be met with in practice by insulated wires in electric light service.

D. C. JACKSON,
Individual Judge.
HENRY S. CARHART,
President Department Committee.

Okonite Company, New York, N. Y.

GROUP 126; CLASS 769—INSULATED WIRE.

AWARD.

A.—RUBBER INSULATED WIRES FOR ELECTRIC LIGHTING.

First. High excellence in insulating qualities.

Second. Durability of insulation under conditions found in commercial service.

Third. Uniform high excellence in mechanical qualities of insulation.

NOTE.—This report is based upon the results of exhaustive tests approximating the various conditions to be met with by insulated wires in electric light service.

B.—LEAD COVERED CABLE FOR UNDERGROUND ELECTRIC LIGHT SERVICE.

This cable has proven successful in commercial service.

D. C. JACKSON.
HENRY S. CARHART.

New York Insulated Wire Company, New York, N. Y.

GROUP 126; CLASS 769—GRIMSHAW WHITE CORE INSULATED WIRE.

AWARD.

First. Durability of insulation.

Second. Mechanical excellence of insulation.

NOTE.—This report is based upon the results of exhaustive tests approximating the various conditions to be met with in practice by insulated wires in electric light service.

D. C. JACKSON.
HENRY S. CARHART.

Simplex Electric Company, Boston, Mass.

GROUP 126; CLASS 769—INSULATED WIRES.

AWARD.

These are good weather-proof wires.

D. C. JACKSON.
HENRY S. CARHART.

Standard Underground Cable Company, Pittsburgh, Pa.

GROUP 126; CLASS 769—LEAD COVERED CABLES FOR UNDERGROUND ELECTRIC LIGHT AND POWER SERVICE.

AWARD.

This cable has proven successful in commercial service.

D. C. JACKSON.
HENRY S. CARHART.

Norwich Insulated Wire Company, New York, N. Y.

GROUP 126; CLASS 769—LEAD COVERED CABLES FOR UNDERGROUND ELECTRIC LIGHT SERVICE.

AWARD.

This cable has proven successful in commercial service.

D. C. JACKSON.
HENRY S. CARHART.

In bare copper and trolley wires, J. A. Roebling's Sons Company receive awards as follows:

First. High conductivity.
Second. Long length.
Third. Great tensile strength.
Fourth. Uniform gauge.

Washburn & Moen receive an award for "high conductivity" on bare copper wire.

A Street Car Ride for One Cent.

TO THE EDITOR OF ELECTRICAL REVIEW:

Enclosed is a clipping from the Savannah, Ga., *Press* for to-day:

There was another cut announced in street car fares this morning. On Wednesday next the City and Suburban will reduce its fare on the Broughton and Habersham street line to one cent. This makes a one cent fare on all its lines except the Whitaker and Abercorn. The outlook is apparently good for a similar reduction on that branch of the system.

It seems two parallel lines here are fighting each other tooth and nail and cutting rates as above. I guess one cent a ride is the cheapest street railway fare in the United States.

Yours truly,
J. G. KRONER,
Savannah, Ga., July 23.

A "Nerve"-ous Spell.

Nerve, "a jurnal for helth and strength," which uses the spellings of the Spelling Reform Association, passes this orthographic compliment on the ELECTRICAL REVIEW:

THE ELECTRICAL REVIEW, of all the technical papers that cums to us none seem to hav the value of this paper.

The daily increasing interest of electricity makes it necessary for the layman, as wel as the professional electrician to know sumthing of the progres of the use of electricity in the development of commercial as wel as social conditions around the world.

The appearance of the ELECTRICAL REVIEW upon one's desk for a few weeks makes it an indispensable articl to every man who cares to keep in touch with the world's progres.

PERSONAL.

Dr. J. Allan Hornsby, secretary of the electrical department, World's Fair, is enjoying our New York weather this week.

Lord Kelvin has been awarded the Grand Médaille of the Société d'Encouragement pour l'Industrie Nationale of Paris for his scientific work.

George G. Crocker, ex-railroad commissioner, and Albert C. Burrage, counsel for the Brookline Gas Light Company, have been appointed Subway Commissioners for the city of Boston.

Mr. J. H. Rhotehamel, president of the Columbia Lamp Company, of St. Louis, was a New York visitor last week. The improved lamp of this company, mentioned elsewhere, is meeting all requirements and Mr. Rhotehamel is greatly pleased with the results of all the comparative tests. Mrs. Rhotehamel accompanies her husband and both will spend a few weeks at Atlantic City.

Mr. A. H. Patterson, vice-president and general manager of the Phœnix Glass Company, is enjoying a vacation in Europe, combining business with pleasure. The large glass manufacturing houses in Germany and other European countries will be visited by Mr. Patterson before he returns. Mrs. Patterson accompanied her husband and they will spend several weeks in bonnie Scotland before returning to New York.

A Successful Trolley Trial Trip.

A car on the new trolley line between Waterbury and Naugatuck, Conn., made its first trip in 36 minutes on Monday evening, July 23. The car was in charge of W. G. Davidson, who superintended the equipping of the cars. Among the passengers were President D. S. Plume, Secretary A. M. Young, Treasurer J. R. Smith, Superintendent E. A. Bradley and G. E. Terry, of the company; C. E. Turner, A. O. Shepardson, Superintendent W. T. Oviatt, of the Connecticut Electric Company; G. E. Cockings, W. G. Moore, George F. Hughes, of Reid & Hughes, and Samuel Hurlbut, of the Samuel Hurlbut Company, New York.

The car is equipped with magnetic brakes which worked to the complete satisfaction of the officers of the road. The motor equipment of the cars was done by the Sperry Electric Railway Company, of Cleveland. The generators at the power station were furnished by the General Electric Company. The engines were made by the Dixon Engineering Company, of Newburgh, N. Y., and the machinery plans for the engines, generators and building were all designed and furnished by the New England Engineering Company, of Waterbury, Conn. Mr. Hurlbut, of New York, had the honor of paying the first fare on the Naugatuck line. This was collared by Mr. Young.

General Electric Company.

The General Electric Company's sales committee has been abolished and the matter of sales has been placed in charge of Vice-president Griffin.

ELECTRIC LIGHT FLASHES.

Plainwell, Mich., wants electric lights.

The town treasurer of Marblehead, Mass., has sold $50,000 30-year four per cent electric light bonds at five and three-eighths per cent premium.

An electric light plant may be placed at Green Lake, Wis., to light the resorts and furnish power for launches. The cost will be about $5,000.

Franklinville, N. Y., business men have informed the local electric light company that it must either reduce the price of illumination or remove its lamps.

The vote on the question of whether Greencastle, Pa., should introduce electric light was 172 against and 74 for the project. Greencastle will still be lighted by oil lamps.

The Hopedale, Mass., Electric Company has at last completed its evidence in the suit against it by the Brush Electric Company, and testimony from the latter is now being taken.

Mr. John H. Reckord, who contracted to light Belair, Md., with electricity, has just closed a contract with the General Electric Company to have the plant erected and in operation by October 1.

Another attempt will be made soon to start the Portland, Conn., electric light plant. The company will try to induce the quarry companies to use electric power. If successful in this attempt the company proposes to start the plant as soon as possible.

Negotiations are now pending whereby the Hastings, Neb., Electric Light and Power Company will soon change hands, and be owned by men with ample capital to make it one of the best plants in the West. It is estimated that aside from the present cost the new improvements will call for an expenditure of about $10,000.

The Citizens' Electric Light Company, of Wellsville, Ohio, recently made an assignment and thus headed off the application of one creditor for a receiver. The court, however, appointed a receiver who demanded the property from the assignee. Threats of contempt of court proceedings were made, but nothing has so far come of them.

The People's Electric Company, of Braddock, Pa., which was chartered early last year, has been dissolved by the stockholders. W. J. Vance was president of the company; A. M. Carlin, vice-president; R. D. Wilson, secretary; and S. D. Hamilton, treasurer. The capital stock was $35,000, of which $3,500 had been paid in, 15 per cent of this having been required for expenditure. The company had four ordinances giving it rights for lighting in Braddock.

The Consolidated Electric Light Company has filed suit in the district court against the city of Kansas City, Kas., to recover $13,262.38, due for lights furnished for the past nine months. The company has the exclusive right to supply the city with electric lights, but it has had much trouble in collecting its bills. Nine months ago the company was given judgment in the district court against the city for about $20,000 for lights furnished. Since that time it has not received a cent for its lights.

Lawyer Anthony Barrett appeared before the Brooklyn, N. Y., Board of Assessors last week in behalf of the Citizens' Electric Illuminating Company and asked a reduction of $100,000 on the $256,000 of the company's assessed personal property. Mr. Barrett claimed that they should not be assessed more than the Municipal Electric Light Company, their capital being the same. The Municipal is assessed $156,000 on its personal property. The Municipal Company put in a claim that their $100,000 of city and United States bonds were non-taxable. The protest of the Citizens' company was referred back to the committee.

LITERARY.

The *Comet*, published weekly at Pittsburgh, Pa., is an illustrated comic paper which has reached our exchange table. The pictures are profuse and the reading matter is witty and keenly satirical. We hope the *Comet* may not collide with any of the larger planets and that it may slide through the ether leaving a luminous trail for years to come.

The August number of *The Forum* comes with its usual quota of timely and suggestive articles. Under the general heading, "Sentimental Dealing with Crime and its World-Wide Increase," Mr. D. McG. Means, a New York publicist, writes on the "Principles Involved in the Recent Strike," reviewing the whole trouble in a calm, dispassionate manner.

"Refrigeration," a most fitting and alluring subject for midsummer contemplation, is discussed in *Cassier's Magazine* for August. W. Wilberforce Smith, the author, devotes his remarks specially to "Refrigeration From Central Stations," telling of what has been done in this line in several large American cities; how the enterprises are conducted, and outlining in a pleasing manner the possibilities still in view for this method of distributing cold. A number of illustrations are given of details of street pipe lines already laid down, house connections, cooling coils in houses, etc.

Scribner's Magazine for August is a fiction number, as has been the custom for seven years. It contains six complete short stories, by H. C. Bunner, T. R. Sullivan, William H. Shelton, W. Graily Hewitt, Octave Uzanne and Harrison Robertson, the author of one of the most famous stories ever published in *Scribner's*, "How the Derby was Won." All these stories are distinguished by an individuality and delicate fancy that make them of unusual quality, even for the high standard of short fiction in American magazines.

The Preparation of Certain Mineral Colors by Electrolysis.

Scheele Green. An electric current is caused to pass through an eight per cent solution of sulphate of soda, by means of two copper electrodes immersed in the solution. The tank containing the solution must be heated by means of spiral steam pipes. A bag of arsenious acid suspended in the warm solution will dissolve and react on the soluble copper salt formed by the action of the current.

According to the *Revue de Chimie Industrielle*, the electrolyzed sulphate of soda yields sulphuric acid and oxygen, which oxidizes the copper.

The oxide of copper dissolves in the acid, while the soda combines with the arsenious acid at the negative pole to form arsenite of soda. The reaction of the arsenite on the sulphate yields a precipitate known as Scheele's green. In order that the process should be continuous, it is only necessary to renew the copper plates from time to time, and to refill the bags with arsenious acid.

Mitis Green. By replacing the arsenious acid in the above process by arsenic acid, arsenate of copper will be obtained, and which is known as Mitis green. As arsenic acid is very soluble, it is slowly added in solution to the bath.

For 100 grammes of copper, 100 grammes of arsenious acid are necessary to produce Scheele green, and 125 grammes of arsenic acid for Mitis green.

One horse-power dissolves 150 grammes of copper per hour, and precipitates from 200 to 225 grammes of green.

Cadmium Yellow is obtained by electrolyzing a solution of chloride of sodium, and using cadmium electrodes. A current of sulphuric acid must be passed through the bath during the process of electrolysis.

Sulphate of cadmium of various tones can be obtained by this method.

Vermilion. In a wooden bath about one metre in diameter and two metres in height are placed two circular plates, on the top of which is a layer of mercury about 1 centimetre thick. These plates constitute the positive pole of a dynamo. The bottom of the tank is fitted with a plate of steel-plated copper, and forms the negative pole. The solution contains eight per cent of nitrate of ammonia and eight per cent of nitrate of soda. A perforated spiral tube is placed in the bath to allow of a current of sulphuretted hydrogen to pass. Red sulphide of mercury is thus obtained.

An attempt has been made to dispense with the currents of gas by using the following bath:

Water	100 litres.
Nitrate of ammonia	4 kilogrammes.
Nitrate of soda	4 "
Sulphide of sodium	4 "
Sulphur	4 "

Vermilion of very fine quality can be obtained by this process, provided the quantity of mercury and its equivalent of sulphur be maintained.

Japanese Red. This color is a lake of oxide of lead colored with eosine. It can be economically prepared by electrolyzing a 10 per cent solution of acetate of soda with two lead electrodes.

The eosine must be run into the bath, and the oxide of lead which is formed will absorb the coloring matter, and can be finally separated by decantation. By varying the strength of the eosine solution, varying depths of color can be obtained. The eosine can be substituted by other colors, such as rodamine. Also, the lead may be replaced by zinc, in which case oxide of zinc would be formed. The acetate of soda can be replaced by nitrate of soda, or a mixture of nitrate of soda and ammonia.—*La Lumière Electrique.*

The Motorman's Trials.

The street urchins who spend their days around Eleventh and Twelfth streets and Third avenue, Brooklyn, N. Y., looking for mischief have found a new amusement, and some of the motormen on the Third avenue trolley line are on the verge of nervous prostration. The boys beg, borrow or steal old clothes until they have succeeded in getting together a very complete man's outfit. The next thing is a dummy, life size, which is well dressed, even to hat and shoes. A dozen or more conspirators, escorting this semblance of a man, stroll carelessly on to the track in front of an advancing car, talking busily. The bell is rung loudly, the boys scatter and the dummy falls across the track. They rush back, apparently in terror, and make futile efforts to get the man out of danger. In the meantime the motorman is in an agony of horror. If he succeeds in stopping before the car goes over the prostrate form, it is pulled off the track and sent flying into the car with wild shouts. The feelings of the unfortunate man at the brake are too vehement for utterance when he discovers the trick. The scheme is very successful just about dark, and whichever way it goes it is great fun for the boys.

Government Telegraph Rates.

Postmaster-General Bissell has issued an order fixing the rates at which official communications may be sent by the various companies during the fiscal year ending June 30, 1895, in accordance with statutes securing to the government the use of telegraph lines "for postal, military and other purposes." Instead of computing the actual distances of transmission the payment will cover the number of miles between the capital of the State or territory or District of Columbia from within which the message is sent, and the capital of the State, territory or the District of Columbia within which received. As regulated by statutes government messages are to have priority over all other business conducted over telegraph lines subject to the order.

When to Advertise.

Dull times, or good times, continuous advertising is judicious advertising.—*Printer's Ink.*

ELECTRIC RAILWAY NOTES.

Trolley service between Fall River and New Bedford, Mass., is now an accomplished fact.

The Delaware County, Md., Electric Railway Company has ordered an electric street sprinkler.

An electric road has been chartered to run from Stroudsburg to Port Jervis on the New York State border. The line will follow the Delaware.

A mortgage for $300,000 against the Leavenworth, Kas., Electric Railroad Company to secure an issue of construction bonds has been filed for record.

The Real Estate Investment Company, of Philadelphia, have brought suit against the Electric Railroad Company, of Little Rock, Ark., for $75,000.

The electric railway companies throughout New York State are gradually equipping their cars with life guards, the latest city to fall in line being Rochester.

Skowhegan, Me., has voted $10,000 in aid of the electric road from Skowhegan to Norridgewock. The vote stood 497 yeas and seven nays. People celebrated the victory with fire-works and cannon.

Cincinnati imposes a tax on street car lines and their receipts. The present ordinance requires companies to pay into the city treasury five per cent of their gross receipts and a license of $4 a foot for each car, making about $64 a year on each car.

The effects of the defunct Boonsboro & Keedysville, Md., Electric Railway have been sold for $1,759 cash to D. Stedward Robinson, of Philadelphia, representing the Hughes & Rigby Engineering Company, of Baltimore. It is doubtful whether the road will ever be completed.

The interest of Nelson Bennett in the Butte, Mont., Consolidated Street Railway Company has been purchased by W. A. Clark and a reorganization of the company has been effected with W. L. Hoge and C. S. Warren as stockholders. Judgments against the street car company aggregating $4,986.37 for employés' wages have been paid by Mr. Clark.

A $5,000 bond, upon which, according to the prevailing opinion, has depended the success or failure of the Tillotson electric street car project, has at last been filed with the city clerk of Oshkosh, Wis. Papers for incorporation, with a capital stock of $1,000,000, are being drawn, and it is expected that work will begin in about three weeks.

The Mineral Ridge and Niles, Ohio, electric railway, which is to be sold early in August, will be bid in, it is expected, by Contractor Monyhan, the builder and principal creditor. The arrangement then is for a company of Mineral Ridge and Niles business men to buy the road from Monyhan. The extension to Girard via Kerr's Corners will be the first move of the owners.

The New York Fire Insurance Tariff Association has increased the rate of insurance on the property of the Brooklyn City Railroad Company from one to six per cent. It is said that the net-work of trolley wires in the various depots and power houses have increased the risk of fires. When the new rates go into operation the company's insurance bill each year will amount to $105,000.

The Highland Avenue and Belt Railroad wants a franchise in a street or two over yonder next to Red Mountain for the purpose of building some 900 feet of additional tracks. Why not give it to them? If anybody wants to do anything these times let's help him. If there was ever a time for encouraging the active spirits among us that time is now.—*Birmingham, Ala., Age-Herald.*

At a recent meeting of the directors of the Schuylkill Electric Railway Company, the following officers were elected: President, Charles H. Barritt, Philadelphia; secretary, Jesse Newlin, Port Carbon; treasurer, William A. Barritt, Jr., Philadelphia; Board, L. W. Weisinger, J. W. Beecher, R. C. Luther, F. H. Treat, Philadelphia; J. K. Seigfried, M. Beddow, L. B. Walker, F. G. Yuengling, August Knecht; Executive Committee, Charles Barritt, Jr., L. W. Weisinger.

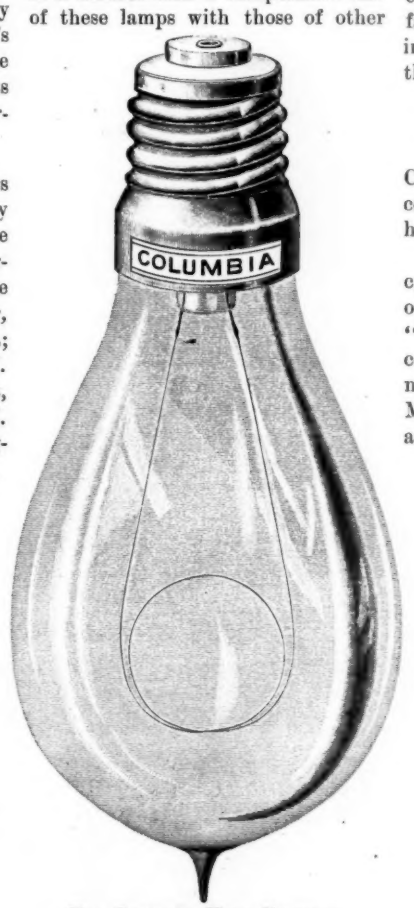
Thirty-five hundred dollars was added to that already subscribed for the proposed electric belt line street railroad in Cohoes, N. Y., last week. The necessary $5,000, which is 10 per cent of the capital stock of the new company, which must be paid in before the road can become incorporated, was paid in in cash, and the selection of 15 incorporators and nine directors was deferred one week. Already $27,760 has been subscribed toward the project.

A project for the construction of the longest railroad in Ohio has just come to light. It is proposed to build a line to connect Columbus with Cincinnati. Application has been made to the Franklin county commissioners for the right of way for an electric line on the National pike from Columbus to the Madison county line. According to the proposed plan the line will run from Columbus to Cincinnati via London, Springfield and Dayton.

Justice Gaynor, in the Supreme Court, Brooklyn, N. Y., has handed down a decision in favor of the Brooklyn Traction Company in a suit that they brought to prevent the city from levying taxes upon them. The company is a controlling one, and the suit was brought not only in behalf of it, but also in behalf of the Long Island Traction Company and several similar companies in Brooklyn. The contention on the part of the company was that the Assessors had no right to tax them, for the reason that they owned no real or personal property.

The Columbia High Economy Incandescent Lamp.

The Columbia Incandescent Lamp Company, of St. Louis, is prepared to furnish a superior lamp of high efficiency for 100, 110 volts, etc., circuits. This lamp is the result of many experiments, lasting several months, conducted by Mr. J. E. Randall, of the Columbia company. The filament is made by an entirely new process, which results in very uniform production and also in the manufacture of lamps having a much higher economy than those of the same voltage heretofore placed on the market. It is claimed that a comparative test of these lamps with those of other



THE COLUMBIA HIGH ECONOMY INCANDESCENT LAMP.

makes shows that they will maintain their candle-power to a higher degree at a higher efficiency that any other lamps heretofore placed on the market. This results from the fact that the resistance of the filament remains the same in the Columbia lamps, and in filaments made of other material the resistance constantly increases, thereby requiring a higher voltage than the initial voltage of the lamp to bring it to its normal candle-power.

While the filament is made in coiled form on account of its extreme length, this is not the special feature of the lamp, but the material from which the filament is made, making it more homogeneous and uniform in results. The use of this lamp, it is claimed, will show a saving to the consumer in energy of from 15 to 20 per cent and a corresponding increased output of the station capacity.

The recent decision of Judge Dallas in the case of the Edison Electric Light Company *vs.* the Citizens' Light, Heat and Power Company, of Lancaster, Pa., leaves the Columbia company in a position to protect its customers. Judge Dallas, it will be remembered, did not pass on the facts in the case, but held that the user of a patented article is not liable as an infringer, when he purchases it of the person who had a legal right to sell it; and held further: "But I am of opinion that, because a preliminary injunction against the maker of these lamps has been refused in the Sixth Circuit, this Court should not, upon interlocutory application, enjoin the use of them by a defendant who brought them from that maker." This would clearly seem to cover the case of the Columbia Incandescent Lamp Company as well, for they evidently have a legal right to manufacture and sell lamps, a preliminary injunction having been refused against them.

St. Paul Convention Notes.

The Western Electric Heating Company, of St. Paul, had a very complete line of electrically heated household appliances.

Mr. W. H. Thorpe, of Beaver Dam, created quite a sensation during one of the sessions by claiming to be too "thickheaded" to see why incandescent lamps after their life of usefulness had passed, should be broken. Mr. Page, of the Edison Lamp Works, assisted by several other members, undertook to enlighten the member, but gave up the task in despair.

Mr. Irving P. Lord, while at Minnehaha Falls, had the misfortune of being mistaken for a Coxeyite by one of the guardians of the grass, and was invited to obey the injunction of the "Keep off the grass" sign. As if to add insult to injury, Mr. O. M. Rau, of the Milwaukee Street Railway Company, was mean enough to "push the button" at that particular time, leaving an indelible record of the sad occurrence.

Mr. W. M. Stewart, of the Siemens & Halske Company, was universally acknowledged to be an apt illustration of the adage that "circumstances alter cases." From a dyed-in-the-wool five wire system man at the last convention, he now has become an enthusiastic advocate of the 220 volt lamp, a sample of which he showed, which, however, turned out to be made by the General Electric Company.

Engineering Courses at the Ohio State University.

The Ohio State University at Columbus, O., provides excellent courses in the principal engineering professions. The course in electrical engineering is well laid out and comprehensive in its scope. The electrical laboratory is unusually well equipped with instruments and apparatus for practical instruction. The shops attached to the University form an important and always valuable feature of a professional course. Prof. B. F. Thomas, who is well known to the readers of the ELECTRICAL REVIEW, is the professor of physics and is in charge of the electrical engineering course at the Ohio State University.

Association of Edison Illuminating Companies.

The next meeting of the Association of Edison Illuminating Companies will be held at Boston, beginning August 14.

Railway Generator Switchboard Panel.

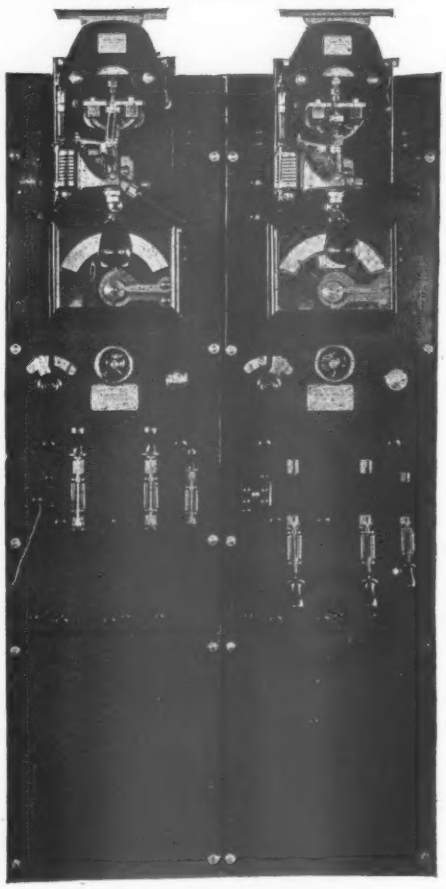
In order that the switchboards of electrical railway stations may be of uniform construction, handsome in appearance and generally a credit to the station, a departure from hitherto accepted methods is necessary. The ELECTRICAL REVIEW described a short time ago a feeder panel of the General Electric Company's make which fulfilled the electrical and æsthetic requirements, and we now show a generator panel made by the same company constituting with that just mentioned the departure in question.

Briefly, the system of switchboard construction, while becoming greatly simplified, is rendered very compact and convenient. All the instruments necessary for the control of each generator are mounted together on an incombustible base and are electrically connected before leaving the factory. Each panel may be erected in position without difficulty or delay. Being of uniform size, it may be bolted by the side of other panels already in place and the switchboard extended, as the capacity of the station increases, without taking away from its uniformity.

These new standard panels are known as type "K" and are constructed in capacities of from 200 to 3,000 amperes corresponding to the generator outputs of from 100 to 1,500 kilowatts. The controlling devices mounted upon each panel are the circuit breaker, current indicator, rheostat, main, field and lighting switches, together with the lightning arrester and cut-outs required for the protection of generator and instruments. A double pole plug switch allows of connection with either a portable or station voltmeter placed in some convenient position. The panels of from 200 to 1,000 ampere capacity are of the same width and height, and in the latter dimensions are similar to the feeder panel. The illustration shows two panels of 400 amperes each.

The automatic circuit breaker is intended to relieve the generator of the severe strain caused by short-circuit. The tripping armature is fitted with an adjustable spring whereby the circuit breaker can be set to open at any desired point within the range of the instrument. The current is nominally carried through a main contact in shunt to a contact operating within a magnetic blow-out. Thus when operating no arc occurs at the main contact. This circuit breaker will effectually rupture any short-circuit, however severe. The armature is provided with a scale 18 inches long which may easily be read at a distance. The positive and negative main switches and the station lighting switch, all of the quick break type, are mounted on the panel, the equalizing switch being mounted on a pedestal near the generators. In the lightning arrester the special feature is an iron-clad electric magnet, in the field of which are two carbon points slightly separated, the line and ground each being connected to one of these points. The magnetic blow-out principle, as in the automatic circuit breaker, is here employed with unvarying reliability. The incombustible controlling rheostat is placed behind the board and is operated by a hand wheel shown on the front. The generator terminals are connected by a small four point plug switch with an illuminated dial voltmeter mounted on an adjustable bracket fastened near the top of the panel.

The panels are supported by vertical angle irons, tie rods and brackets. They are wired complete, and after setting in place it is only necessary to connect the leads from the generators and bolt in place the bus bars, which run horizontally back of the switchboard.



RAILWAY GENERATOR SWITCHBOARD.

The Bristol Company's Recording Instruments.

The Bristol Company, of Waterbury, Conn., are among the best known and most reliable manufacturers of recording instruments for pressure, temperature and electricity. They also make the popular Bristol steel belt lacing. They are constantly extending their line of recording instruments, which now includes a list of 30 ranges of recording pressure gauges, from full vacuum to 1,500 pounds per square inch; 10 ranges of recording voltmeters for both alternating and direct currents; three ranges of recording amperemeters; two ranges of recording wattmeters; and two ranges of recording pyrometers for dry kilns and ovens. These latter instruments are so constructed that the recording portion may be located 25 feet away from the point at which the temperature is being measured.

The business of the Bristol company has completely outgrown their present quarters and they are now erecting a new brick building 50x150 feet in size with an iron truss roof. The Bristol company have sold a large number of their recording voltmeters to electric light and electric street railway companies, and all the instruments are giving the highest satisfaction.

The Executive Committee of the Bridgport, Conn., Traction Company has decided that fenders must be used on the trolley cars in that city.

TELEPHONE NEWS AND COMMENT.

South Dakota has raised the tax on telephones.

The Harrison people are trying to get a franchise at Mt. Vernon, O.

A new telephone line is being built from Beaver, Pa., to Steubenville, O.

Florence, S. C., will have a telephone exchange starting with 30 subscribers.

The Ohio Harrison Telephone Construction Company will put in a plant at Delaware, O.

Arthur W. S. Davis, of Lowell, Mass., is reported to have invented a long distance instrument for which strong claims are made.

Dr. George R. Robinson, of Sayville, Long Island, has established a telephone line between that place and Bayport, two miles to the East.

The Southwestern Telegraph and Telephone Company has filed with the Secretary of State, of New York, a certificate of an increase of its capital stock from $2,000,000 to $3,000,000. The debts of the company amount to $280,106.

General Superintendent W. W. Nicholson has sent to the ELECTRICAL REVIEW an official list of subscribers of the Central New York Telephone and Telegraph Company. The list is well prepared and includes the names of subscribers in Syracuse, Utica and the surrounding towns.

The New England Telephone and Telegraph Company has declared a dividend of $1 per share, payable August 15. Books close July 31 and reopen August 16. This is an increase of 25 cents per share over previous August dividends.

A new telephone company, said to be backed by reliable business men, has been organized at Portland, Me., and, it is said, will soon begin active operations. The rates, now $50, will be reduced to $25, and the metallic return, costing $75 to $90, will be furnished at $37.50.

The output of the American Bell Telephone Company for the month ending July 20 was as follows:

	1894.	1893.	Inc.	Dec.
Gross output	6,430	7,117	....	687
Returned	5,754	4,818	936	....
Net	676	2,299	....	1,623
Since Dec. 20:				
Gross output	47,455	59,466	....	12,011
Returned	40,449	32,752	7,697	....
Net	7,006	26,714	....	19,708

The ordinance granting to the Home Telephone Company a franchise to operate a system of telephones at Seattle, Wash., has been passed by the Board of Aldermen. It is agreed by the company to pay the city one per cent of the gross earnings after being in operation one year, and to charge but $4 for offices and $2 for residences.

The Western Telephone Construction Company, of Chicago, is making arrangements to operate in Indiana, with Indianapolis as the center, upon a plan which it is thought will be the general plan in all telephone operations in the future. This starts with a central city as the radiating point and embraces in each system all the smaller towns of the State, where local companies are being organized.

The Walnut Hills District Telegraph Company, the Ohio Messenger Telegraph Company, the American District Telegraph Company and the National Automatic Fire Alarm Company have all brought suit against the city of Cincinnati, alleging that they have applied to the proper authorities for authority to use certain streets for their respective lines, but have not been able to agree as to the mode of use and ask that the court determine the same.

The St. Louis County Court has granted a franchise to a number of gentlemen in the neighborhood of Kirkwood, Mo., to operate a private telephone system. The business men of that section have for several years endeavored to get the Bell Telephone Company to run lines to their private residences, but the company has always refused. The gentlemen have taken the matter into their own hands and will organize a company and put up the lines. A central station at Kirkwood will connect the private lines with the Bell telephone lines if permitted, thus giving connection with the city.

National Lithographic Company Goes Up.

The National Lithographic Company, of Washington, D. C., which was organized by Josiah Quincy while he was Assistant Secretary of State to do the Patent Office printing, and which secured the contract by fraud and misrepresentation, has gone all to pieces. The men who composed the company have fallen out and are charging each other with every sort of rascality, and the people from whom they purchased their plant and printing material are suing them for pay. Not less than nine suits have already been commenced in the courts by the officers of the company and its creditors. Horace Kenney, the originator and chief manager of the enterprise, has left town, and is said to have taken the books of the company with him. Mr. Bailey, the outside man and talking partner, was the first to disappear, and his whereabouts is unknown. Mr. Dunn, practical lithographer and superintendent, is still in Washington watching over the presses that have never been paid for, and trying to have a receiver appointed to settle the company's affairs.

A Novel Electric Light Meter.

Among the numerous meters that have been invented during the last year, only a few have ever gone into actual use, and, if so, their life, though promising to be a long one, has generally come to a speedy end. A notable exception to this nearly universal rule is the meter originally invented and patented by M. Grassot, of Paris. It is an electrolytic counting instrument, but unlike its many predecessors luckily avoids their mistakes and inherent faults. Referring to the annexed drawing, f is a carefully weighted silver wire, cone-shaped at its lower end f_1, which bears lightly upon a small china disk a, which in turn is immersed in a vase filled with a solution of nitrate of silver. The wire f bears a small cylindrical weight at its upper end, sufficiently small to glide through the glass tube which encloses f. Two springs s lead the current to be measured to the silver wire whence it passes into the nitrate of silver solution and out by means of e. It is evident that the current passing through f dissolves a certain quantity of silver from the end immersed in the nitrate of silver solution, while by a well-known electrolytic process it will increase the weight of e by an equal amount of silver. But as soon as the weight or length of the silver wire f is reduced, it descends and thereby turns a small pivoted disk connected with the counting mechanism.

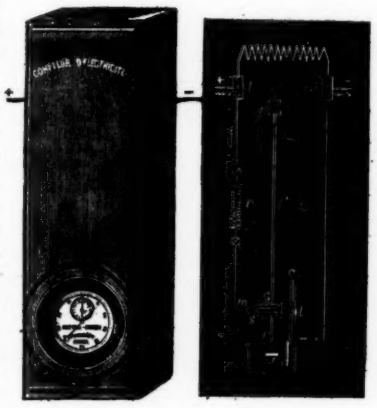
Referring once more to the diagram, it will be noted that there is a small resistance R between the binding posts J and J^1, and that the meter is shunted between the latter. Again, there is a comparatively high resistance r in the wire leading from J to S. According to the well-known shunt laws the current in the two branches must be in the proportion $R : r$, or, in other words, only a very small portion of the current (which portion can be determined exactly) passes through the meter. This electrical arrangement prevents the rapid and practically useless loss in weight of wire f, which in turns permits the undisturbed operation of the apparatus for at least a month.

M. Hospitalier, who brought M. Grassot's counter to the attention of the Société Internationale des Electriciens, June 6, 1894, vouches for the exact work done by the meter.

Using a current of three amperes, R should be 0.4 ohms and $r = 2{,}750$ ohms. Under these conditions the observed instrument errors are :

Current in amperes.	Percentage of error.
0.5	6
1.5	2
3	0

M. Hospitalier states that the Edison meter so largely used in the United States has a much larger percentage of instrument error, in addition to other and more serious defects. The price of M. Grassot's meter is quite reasonable.



A Novel Electric Light Meter.

After years of faithful work and hard struggling the officers of the Flushing and College Point, Long Island, realized their inability to successfully operate the road, and President David Master has turned the entire plant over to a receiver, William H. Browne, who was appointed by Judge Benedict, of the United States Circuit, upon the application of the Westinghouse Electric and Manufacturing Company, to whom the road is indebted to the extent of $37,000. Of this amount $36,000 is in bonds and $1,000 for supplies. Interest on the bonds was due July 1, and not being paid proceedings were commenced at once.

Standard Paint Company Successfully Defends Its Patents.

The United States Circuit Court for the district of New Jersey has rendered a decree in the case of the Standard Paint Company, of New York city, *vs.* Henry J. Bird and James L. Reynolds, in which it is adjudged that the assignors of this company were the first persons to produce a paper coated with the solid residuum of petroleum, and combining the characteristics of an odorless, water, acid, alkali and air-proof paper, and that the patent under which the Standard Paint Company has hitherto manufactured was valid and had been infringed. The court, by Hon. George M. Dallas, circuit judge, holds that any paper possessing the same essential characteristics and produced by the coating with any material similar to that employed by this company, by whatever name it may be called, is an infringement of their patent, and that the patent is good and valid in law. We quote from Judge Dallas' opinion :

"As has been said, 'the products, *i. e.*, the coating materials, however and from whatever produced, are the same, and by the use of either, the same manufactured article is created, and this, in the sense of the patent law, constitutes identity. The material itself, not the substance from which it may be obtained, is the gist of the matter,' and, 'a patented manufacture is infringed by the making use or sale of any manufacture which possesses the same essential characteristics.' It is because it had never been used before, as and for the purpose for which the patentees employed it, that the patent which they obtained is *impregnable to assault on the ground of anticipation.*"

The court made a decree giving the Standard Paint Company a permanent injunction against the defendants in the action referred to, and directing that an accounting be had to ascertain and determine the damages to the complainant by reason of the infringement.

The litigation has covered a period of over four years, and has been attended by large expenditure and losses incident to this and other infringements. Having now obtained an injunction in the courts, the Standard Paint Company will, of course, seek to fully protect their rights. The Standard Paint Company's insulating papers are known as Giant and Little Giant P. & B. insulating papers.

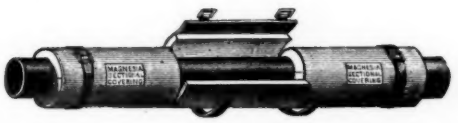
The Correspondence School of Mechanics and Industrial Science.

This school is conducted by the Colliery Engineer Company, of Scranton, Pa., and holds a high position among institutions of its kind. All that is required for entrance to any of the numerous classes is the ability to read and write. The testimonials sent to the proprietors of the school by former students are very flattering and show the high esteem in which it is held. Below is given an abstract from a recent letter written by Mr. T. J. Foster, the manager, to the ELECTRICAL REVIEW :

"When an intending student is so situated as to be able to take a course of instruction in a regular school we advise him to do so, as we do not claim to fill the place of the regular colleges and technical schools. Our method is adapted to the requirement of the large class of uneducated practical men whom the regular schools cannot help ; those who either would not study or did not have the opportunity to study when young, and who, now that they cannot quit work to attend school, are willing to do the next best thing, *i. e.*, study at home in their leisure hours. To every man who enrolls we guarantee instruction until he is proficient in the subjects included in his scholarship, no matter how long it may take."

A Trolley Line Without Poles.

Chemnitz, Saxony, has banished horses from her street cars and substituted the trolley. In a report to the State Department on the subject, Consul J. C. Monoghan says one of the principal novelties of the adopted system is that no poles are used. The method of stringing wires is by means of ornamental rosettes fastened into the wood-work or walls of houses, having projecting hooks to which the wires are attached. These hooks are firmly fastened and are tested with seven times the weight they will be called upon to bear.

ABSOLUTELY

FIRE-PROOF.

MAGNESIA

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KINDRED INTERESTS

The Fort Wayne Electric Corporation, through its New York State agent, Mr. W. J. Morrison, has sold two 60 light Wood arc dynamos to D. McCarthy & Company, of Syracuse, N. Y.

Russell & Company, Massillon, Ohio, report quite an improvement in business, particularly in their engine department. Some 30 big orders on their books make their shop a lively scene during the Summer months.

The Weston Engine Company, of Painted Post, New York, report that they are receiving their share of orders for the well-known Weston automatic engine. This company has met with excellent success and has installed quite a number of engines in electrical circles.

The Phillips Insulated Wire Company, Pawtucket, R. I., report that business is running on with them in the same good old-fashioned way that this company have always enjoyed. Good goods, resulting in good orders and plenty of them is the pleasant state of affairs with this company.

Baker & Company, platinum dealers, of Newark, N. J., report an increase in the price of platinum. This valuable metal enters largely into electrical manufacture and the industry will be interested in any advance in price. Business with Baker & Company is much more active than at this time last year.

The Harrison International Telephone Construction Company is engaged in moving its main offices to Chicago. Handsome and commodious quarters have been secured in the Chamber of Commerce building, which will soon be ready for the reception of the friends and patrons of the company.

The National Pipe Bending Company, New Haven, Conn., have issued several useful booklets giving a great deal of information about the National feed water heater. Every steam user will be interested in this matter and should write for the booklets. Over 600,000 horse-power of National feed water heaters have been sold.

Armington & Sims, Providence, R.I., are in receipt of orders for a number of large direct connected engines and dynamos. Their work in this line is said to possess some new features that make happy the large power house and large central station owners. E. P. Hampson & Co. are the highly successful New York agents.

The Berlin Iron Bridge Company, of East Berlin, Conn., have received the contract from M. C. Henry & Company, of New York, N. Y., to cover their stone yard with an iron roof, and also for a traveling crane. The building will be 50 feet in width and 100 feet in length, constructed entirely of iron, the whole space to be controlled by the traveling crane.

The Orders of the Westinghouse Electric and Manufacturing Company for July will probably exceed the orders for any month in the history of the company. The company is occupying every available inch of its room in Pittsburgh and expects to be operating its new works at Brinton in September. June shipments exceeded $560,000 and July orders are in excess of this sum.

The American Electrical Works, Providence, R. I., are running double time in several of their departments, and in nearly all of them full time has been resumed. This house has a reputation for quality and reliability of goods second to none, and that their business, which touches a great many branches of the electrical industry, is so good is strong proof of the improvement in commercial circles. The extensive new works of this company are at Phillipsdale, on the banks of the river, and the official staff go out every morning in the swiftly-running naptha launch, "Frolic"—a very appropriate name for the bateau that carries these hardworking officials to their daily tasks.

The Pettingell-Andrews Company, 72 and 74 Federal street, Boston, are now fully established in their new quarters where they have opened one of the finest and best equipped electrical supply houses in the world. They have recently gone into the electric railway business and in future will make this department an importatant feature. The Pettingell-Andrews company have recently secured the entire United States agency for the sale of the Billings & Spencer commutator bars and they expect that this will increase their railway business to a large extent. The company will open a New York office in a short time in order to more carefully look after their southern and western trade.

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